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EDITORIAL ETCHINGS.

The last meeting of the Agricultural Student Union of Ohio was a revelation to many concerning the work that can be accomplished by organization. In the first address of the evening Mr. Fred K. Luke told of the work that has been done, and is being done, by Cornell University to aid in the diffusion of knowledge in the state of New York. The work of university extension in that state was first suggested by the action of a few farmers of Chautauqua county, who offered their vineyards to the university for experimental purposes in 1893. The university, with the aid of a small appropriation, secured from the state some time later, began the work, and from that time to this the movement has grown steadily in magnitude and interest.

In his address upon "Co-operative Experiments in Agriculture for Thirteen Years," Professor C. A. Zavitz, of Ontario Agricultural College, showed what it was possible for a student union to accomplish. When the Ontario Agricultural and Experimental Union was started some twenty years ago, there were twelve experimenters; during the year just past there were over two thousand. This marvelous growth

is due to the interest and push of the officers of the institution (and particularly Professor Zavitz), and to the interest which the farmers of Ontario have taken in the movement.

Why can not the Union of Ohio achieve something in this way? We are handicapped, to be sure, by the separation of the university and experiment station, but this difficulty may be overcome by a little change in the plan of organization of the Union. Kindly pay heed to any communication which you may receive concerning this work, and if any information is desired write to the secretary, John F. Cunningham, Horticultural Hall, Ohio State University, Columbus.

The experiment station at Wooster has lately published a newspaper bulletin, which contains a very timely "warning against fraudulent tree peddlers." As the bulletin says, "the Ohio Experiment Station has no police powers and does not go about the country hunting up swindlers, but not infrequently is appealed to regarding the reasonableness of claims made by venders of agricultural and horticultural articles."

It is surely true that there should be some way provided by which the

agricultural population should be apprised of the danger of being defrauded by unscrupulous individuals, who claim to be representing reliable firms. It is often the case that nursery men will sell a block of trees to agents, and then allow them to use their name as a guarantee of the genuineness of the stock, without themselves guaranteeing it.

The bulletin goes on to say that "The claim that any nursery man has a secret process of propagation unknown to others, or a variety which he controls, is preposterous.

There are no horticultural secrets, or patents, on varieties. There are trademarks on the names of varieties, but this merely prevents the general use of the name and not the variety. There is absolute free trade in horticulture, for the fraternity long ago gave up trying to keep secrets from each other."

In the Shanghai (China) Mercury of Nov. 7, 1898, which arrived a few days ago, we notice the following statement in a letter from a native: "The Empress-Dowager issued edicts ordering a change of the old military tactics to those of foreign nations, the establishment of schools for the foreign studies, and the promotion of improvements in agriculture and commerce, which are to be effectively carried out, and also that all foreign officials, Christians, must be well treated and protected. The edicts are in black and white and can be referred to."

This looks encouraging to those who are looking for an improvement in the conditions of the Chinese nation, and, if true, certainly goes to disprove the general impression that the Empress-Dowager is standing in the way of European and American progress in that country.

The possible improvement in agricultural methods are important to

agriculturists and the manufacturers of agricultural implements in this country. Should the possible improvement in agricultural methods become a reality there will be a vast farming country thrown open to American rather than to any other form of agricultural methods, and this would mean that American machinery and Americans to run it must be procured. There will certainly be an opening for students in China before a great while. Already the Ohio State University has received a call for two men to take charge of a large farm, to be run upon American principles. Cornell University has two alumni in China now superintending a large farm and starting an agricultural college.

For some years past the most popular subject for discussion at farmers' institutes has been "How Shall We Keep the Boys on the Farm?"—and in many places the question still remains unsettled. The following note from the Minneapolis (Minn.) Journal is of interest along this line:

"O. C. Gregg, superintendent of the farmers' institute work in this state, says that the migration of the young men from the country to the cities has been checked in Minnesota. He cites as the reason the improved condition of the farming population. This improvement has been largely brought about by an intelligent study of agricultural methods. About ten or twelve years ago Governor Pillsbury, at his own expense, to start with, employed Mr. Gregg to travel through the state, holding meetings at various places for the discussion of improved methods of agriculture and stock raising. This work was soon afterward taken up by the state, and appropriations were made by the legislature for the

purpose of carrying on what are now known as the farmers' institutes. *

* * About the same time a foundation was laid for the splendid institution known as the school of agriculture at the state farm at St. Anthony park. * * * The result of such efforts in behalf of improved methods in agriculture, and better conditions of life upon the farm, ought to begin to manifest themselves by this time, and Mr. Gregg says that they are apparent. The agricultural college has ceased to draw from the farm in order to crowd the ranks of the professions, and is implanting in the young men of the rural population a larger respect for and a deeper interest in their own occupation, and is saving for the pursuits of husbandry a larger share of the more intelligent, ambitious and progressive young men, whose trend toward the cities has been so constant and so detrimental to agricultural pursuits on the one hand, while crowding beyond the limit of reasonable demand the avenues of trade in the cities and the ranks of the professions."

The same state of affairs exists in Ohio today, as is shown by the increased attendance at our college, and, what means as much, the larger percentage of college bred men and women, who return to the farm, even though their education was not strictly along agricultural lines. With the better general education will come better general conditions, for the best head generally wins; but where the education is clearly agricultural the improvement is marked, indeed.

Asparagus Club Bulletin for January.

Jan. 3.—Thorough discussion of the news of the week by the members.

Jan. 10.—"Gladiolus Bulb Culture and Propagation," E. H. Cush-

man, Euclid, O.; short talk by Professor C. A. Zavitz, Guelph, Ontario.

Jan. 17.—"News," discussion by the members; "Porto Rico, Its Ways and Customs," C. K. McClelland.

Jan. 24.—"News," Otto E. Jennings; "The Pedigree of the Daisy," A. D. Mason.

A Letter.

Professor W. R. Lazenby has received a letter from Charles P. Fox, an alumnus of the college of agriculture, which may interest some of his many friends and acquaintances. The letter is written from Warren, Pa., and we take pleasure in presenting the following extracts:

Dear Sir—Yesterday I had the opportunity of visiting a plant that was of much interest to me, and I trust that a short description of it will interest you, as it has a direct bearing on the subject of "Forestry." It was called "Russell Chemical Works." The products of this factory are charcoal, wood alcohol, acetate of lime, wood tar, gas, etc. The raw material is wood. The wood comes to the factory cut into 50-inch lengths and is kept like first-class cord wood. It is placed in iron retorts and subjected to high heat. The volatile portions of the wood distill over and are washed with water, and such as will condense are run off in liquid form to vats. The gas (non-condensable) is taken under the furnace and is used as fuel. The liquid portion is now treated in various ways to separate the alcohol from the wood tar. The main process is distillation. The acid solution is neutralized with lime and then concentrated in large pans until the crude calcium acetate separates out. The crude salt is baked upon an iron stage until it is thoroughly dry. It is then passed through screens, packed in barrels and sent to market. The alcohol (methyl) is put

in cast iron drums. The wood tar is burned.

Wood alcohol is used to "cut" or dissolve gums in making varnish, fuel in lamps, etc. It is a yellowish colored liquid, sp. g. 82; odor and taste like that of crude carbolic acid.

The crude acetate of lime is a greyish brown substance without crystalline form, and with a peculiar and rather pleasant odor. It is used in commerce as the source of acetic acid. Also used in calico printing.

Charcoal is used by furnacemen in making "charcoal iron." Also used in making gunpowder.

Gas and wood tar are used as fuel.

Mr. Allen, the obliging superintendent, gave me these facts of interest:

Pay roll, 11 hands; capacity, ten cords of wood. Yield: A cord of wood yields 7 to 10 gallons of alcohol, 60 bushels of charcoal and 200 lbs. of acetate. The gas and tar are not measured.

Kinds of wood: Hard maple, black birch and beech; best in order named. White birch and soft maple are poor. The latter contains some kind of oil that causes a milky color in the alcohol. The industry is quite well developed in this section.

I am now traveling for the U. S. separator people. While in Bellow Falls I saw the train that brought the remains of Senator Morrill back to their final resting place among the Green mountains of old Vermont. Vermont is proud of her sons, whether they were at Ticonderoga, Washington or Manilla. Morrill was loved, honored and respected, and I can not help but feel that the agricultural colleges of America have lost their dearest friend.

"Ohio Leads in Higher Education in Agriculture."

The above is the title of quite an extended article in the Louisiana

Planter and Sugar Manufacturer. The article referred to appeared some weeks ago, and is in the form of a letter. It starts out as follows: "The headquarters of the College of Agriculture and Domestic Science of the Ohio State University is now in Townsend Hall, a handsome edifice, completed and equipped this autumn at a cost of over \$100,000. The lands (comprising over 375 acres within the city limits), buildings and equipments of the Ohio State University are estimated to be worth over \$2,000,000. The buildings, besides a number of fine modern residences for the executive officers and professors, embrace this new Townsend Hall, Horticultural Hall, Veterinary Hospital, Hayes Hall (where the mechanic arts are taught), Botanical Hall, Biological Hall, Orton Hall (museum and library), and the Armory and the Gymnasium, recently furnished, and one of the finest institutions of the kind in America.

The University has over 80 instructors and 38 departments of study, and offers 30 distinct courses, all but one of which require two or more years for its completion. Six of these courses are offered by the College of Agriculture and Domestic Science, and are in charge of the most able specialists that liberal salaries can command, among them being Professor H. A. Weber, educated in the best schools of Europe, and who has given his life to the study of the chemistry of soils and plants and that which appertains to agriculture and the foods of man. Professor Weber's experience with sugar, practical and in the laboratory, covers more than a quarter of a century. A great many years ago he was the foremost to build up the sorghum industry, but the falling European market, due to the overproduction of beet sugar, especially

in Germany, caused the death for all time of that branch of the sugar industry."

The article then goes on to give an account of the experiments and investigations that Professor Weber has been carrying on.

We are glad, indeed, to notice the favorable manner in which this, the organ of the Louisiana Sugar Planters' Association, and the Sugar Planters' Associations of Texas and Kansas, and the Louisiana Sugar Chemists' Association, comments upon the State University of Ohio.

The Agricultural Press on Annexation and Imperialism.

We take the following clippings from some of the agricultural papers of the country as expressing the different editorial objections to the annexation policy:

The proposed expansion means endless and vexing foreign complications, vast expenditures on fortifications, large increase of army and navy, great waste of life and treasure, dangerous increment of political corruption in the foolish effort to engraft a colonial policy upon our system, and enormously increased taxation.—Maine Farmer, Augusta.

We see that we are conquering the markets of the world at a wonderful rate, putting a balance of trade of two millions to our credit every day, and we question whether we have great need of the patronage of a race of barbarians, who buy next to nothing.—New Hampshire Mirror and Farmer.

The American farmer who now grows leaf tobacco or sugar cane or sugar beets, or who wishes to grow them, would not only have to pay this double taxation for the benefit of colonial monopoly; but, in addition, he would suffer heavily by having his own interests in these lines absolutely ruined.—New England Homestead.

Tropical produce and labor would unjustly compete with or destroy great agricultural and manufacturing industries in the United States, curtail the customs revenue and involve all sorts of political evils.—Farm and Home.

Where do our domestic growers of sugar beets and tobacco come in on this scheme of territorial expansion? The Philippines offer most excellent opportunities for wool growing, better in fact than Australia or South America. The land is rich and herds can feed on the plains all the year. Wool can be grown there for half the money that it can on the farm in Ohio and Maryland, and of quality just as good. Maryland wool sold for 14c per lb. two years ago when wool was imported free. It now sells for 25c and is in good demand.—Culturist and Fruit Grower.

There has been a large expenditure in this country in factories for the manufacture of sugar from beets, and many farmers have turned their attention to sugar beet culture. It would seem now that the sugar beet was doomed by the prospective rivalry of the sugar plantations of Cuba.—Green's Fruit Grower.

There is not much of a field for American crops in the Philippines. Perhaps it would be better to listen to the voice of Aguinaldo when he sings "Uncle Sam, please turn me loose."—The Grape Belt.

The best things in agriculture today in the United States are the specialties that free trade with the tropics would knock out.—American Agriculturist.

The idea of protection to American industries, of a zealous regard for American interests and American rights first has become thoroughly incorporated in our political system, and no "open door" policy will warrant our sacrificing that idea.—California Press and Horticulturist.

Address of Prof. C. A. Zavitz before Agricultural Student Union, Jan. 11, 1899.

(Abstract.)

I will tell you in as plain a way as possible what we are doing at Ontario for the farmer. The growth of the Experimental Union at Ontario was illustrated by the growth of an apple tree from the seed to the mature tree bearing its fruit—a gradual but steady growth from a small beginning to a firm position in the agricultural work of the province.

The school of agriculture was started in 1875. At this time there were 550 acres of land, with a residence upon it. Now there are a number of fine buildings. In 1876 experimental work was started. In 1886 there were only a few over 80 plots, but now there are over 2,000. The school draws its students from among the best young men of the province. They get a training in careful methods and along various lines of science. These men are being used to aid in bringing the results of our experiments to the farmers of Ontario, through the Ontario Agricultural and Experimental Union. The main object of this union was to form a bond of union among the students and officers of the institution. After five or six years it was seen that there was a great need of co-operative experimental work to give a chance for the graduates to keep up their high standard of excellence, which they had acquired while at the institution. When the work began in 1886 there were 12 students interested. The next year there were 60 students interested. Then, after two or three years, there came to be more, and from that time on there has been a steady increase in interest and experiments. The work of the Union is divided up into different branches, comprising agriculture, horticultural,

apiculture, etc., and at the head of each of these branches is placed a committee, who has a report of the work to make. The start was made with one experiment and 12 workers. In 1898 we had 19 experimenters and over 3,000 experimenters. In the selection of these experiments we select the very practical ones. We aim especially not to make the experiments too complicated. All of our work is based upon experiments conducted at the experiment station.

(Chart showing acres in farm crops in Ontario.)

From among the many varieties of farm crops tested, through a period of several years, a certain number, say five or six, which have given the best results, are selected and sent out among the farmers, that they may determine for themselves which are best suited to their needs.

In the spring of the year a circular is sent out inviting persons to join the experimenters in their work. This circular contains information concerning the work, methods of carrying it out and general instructions. All the materials for the work are furnished, and blanks are sent out for reports. Carefulness and accuracy are urged. All applications should be sent in early for seed and materials.

(Reading of experiments carried on.)

The experimenters have a choice of any of the 19 experiments upon which to work. In selecting men for this work the ex-students were first selected; then, as the organization grew, farmers were added to the list. After five or six years of work people began to show their interest in the work by inquiring after the results of the experiments. At first not much attention was paid to them, but after we had results to

show we began to bring them out. From this time on the people began to apply the results, and thus help in the work. Ex-students and good men were the foundations for this work.

Our entire work is done by correspondence. Every year, for 14 years, we have added to and improved the work. We are very strict and careful in instructions, having them very simple and plain. After the reports come in they are revised very carefully, and only the most successful experiments are kept.

(Resume of experiments and methods of conducting them.)

(Reading extracts of letters from experimenters.)

The importance of pure seeds is strongly emphasized, and all the seeds have to pass inspection before they are sent out to the experimenters. Many times in buying seeds foul seed is found. If work of this kind is to be done at all, it must be done well. The students are required to look over the seeds, and it gives them valuable lessons in selection.

The work of the Union is beginning to be recognized by those who are highest in agriculture. Experimental work encourages careful tending and close observation. It is very useful in giving the farmer a start in pure seed, and from him to other farmers. The results of the work on one farm are given to others. The crops and farms of these workers form valuable object lessons. The important results are demanded in the farmers' institutes. The conclusions from the work of the Union are published in the report of the Department of Agriculture at Toronto. The whole system tends to keep the ex-students in touch with the work at the experiment station, and to advance the cause of agriculture in Ontario.

No work will be fraught with greater advantage to yourself, to your college, or to your neighbors, than this. To do the best for yourself, you must do the best for others.

University Extension and the Farmer.

Cornell University is without a doubt one of the greatest, most influential and useful institutions in the land. If we study Cornell with all its phases of work, this statement is none too strong. Cornell University, in its true sense, is not limited to the few buildings on East Hill usually known as such. Neither is the number of students limited to the 2,000 who annually register at the university proper. Its campus contains some 49,000 square miles, or the whole state of New York. As students Cornell claims a considerable portion of the population of the state. Her courses of study are not strictly limited to those enumerated in the university catalogue. She goes much farther than that. She, wrapped in the robe of Nature Study, enters the public school, takes the little boy and girl just entering by the hand, and teaches them to really see the things they see. Or, robed in the apparel of an agriculturist, she becomes a tiller of the soil. In this work she does not limit herself to the university farm proper, but applies it to her large farm the state of New York. Cornell is active all over this vast area. On the farm, in the orchard, in the nursery, in the vineyard, in the garden, in the hot house, everywhere she offers her assistance.

The farmer in New York has for some time caused the state considerable anxiety. The young generation is deserting the farm and choosing most any other occupation. If this continues the farm will return to wilderness. In these days there seems to be a great desire for science and scientific education. The young

man seems to think if he can study anything aside from agriculture he is studying a science, and will escape the drudgery of the farm. I truly believe if that young man knew how much science there is on the farm he is about to desert he would in many cases change his mind. What spot on earth contains more science than the farm? No matter where we turn, in what direction we are moving, or where the eye rests, it is all science.

I think our failures on the farm are largely due to the fact that we too often disregard the nature of things, and try to do them in our own way and hope to bring about good results under conditions very foreign to the things with which we are working.

In the autumn of 1896 Prof. Bailey visited a school and learned that the pupils lived on the farm. When asked how many would follow farming as a business the number who had any such notion was appallingly small. If my memory serves me right, farming as a business received no support whatever in that school. With such incidents, such awful conditions before them, the people of New York grasped the situation and went to work with greater zeal than ever before in an earnest endeavor to remedy such disastrous conditions.

What started out as a few experiments in some of the vineyards of western New York is now a state movement in behalf of the farmer and his farm. So that now New York, in view of the grand work she has undertaken to help the farmer, may with justice hope and believe that the next generation will find conditions vastly different and equally more favorable than the present generation found.

EXTENSION WORK.

What is known as the extension work has prospered under different

names. It was first known as "Horticultural Extension." It soon became apparent that work of this nature should apply to the whole subject of agriculture. Thus it grew into "Agricultural Extension." To-day the Cornell University extension work covers the agricultural schools held in various parts of the state, the Nature Study and the farmers' reading course. The extension work was at first a part of the Experiment Station and purely horticultural. The movement originated with the people of western New York. In 1893 some of the people of Chautauqua county offered their vineyards, and requested the station at Cornell to undertake some experiments in them. This was impossible, as the station lacked adequate funds for such work. This was not the end of it. If there is no money for such work, some way must be devised by means of which such money can be secured. This work must not stop on account of a little financial discouragement. In the following winter the people of Chautauqua county worked for a small appropriation to carry on this work. They entrusted it to Hon. S. F. Nixon, assemblyman from that county, who early in 1894 secured for them \$16,000, half of which was given to Cornell Experiment Station, that the work desired might be undertaken. The work was at first horticultural and limited to 16 counties of western New York.

After a year's experience in this work, Mr. Nixon secured \$16,000 for the Cornell station. The work was outlined as follows: "Conducting investigations and experiments, disseminating horticultural knowledge by means of lectures and otherwise, and preparing and printing the results of the work. Some of the experiments were conducted in the vineyards of western New York,

while others, due to better facilities, were tried at the station. Those in charge of the work studied the country to which the work applied and sought to investigate such phases as would apply to western New York.

TEACHING.

Among the many other good things which Prof. Bailey says under this head is this: "The work of the experiment station must be carried to every farmer's door, and if he shut the door they must be thrown in at the window."

In 1896 a series of meetings were held in various parts of western New York. The assertion sometimes made that you can't get farmers out, and that people are not interested in agricultural meetings, was literally disproven here. The attendance at these meetings ranged from 200 to 2,000 per meeting.

HORTICULTURAL SCHOOLS.

The horticultural schools were designed to carry the best part of university extension to the farmer. The instruction given in these schools is, of course, fundamental, and given in such a way that it may be interesting and set the hearer to thinking as well. "If," says Prof. Bailey, "the farmer thinks correctly, he then does correctly." A school would have a session of from two to four days and carry an enrolment of from 60 to 100 persons. Prof. Bailey is of the opinion that "it is generally only the most influential persons who attend these schools, and they spread the information far and wide; and the teaching is perhaps all the better for being second-hand and for being worked over into more assimilable shape." To give you an idea of the character of these schools, permit me to mention the topics used in one of them. This particular school held a four days' session in Chautauqua county: Observation Upon Twigs,

How Plants Live and Grow, An Analysis of Landscape, Observation Upon Fruit Buds, The Nursery, Observation Upon Seeds, A Brief of the Evolution of Plants, The Geological History of Soils, Observation Upon Leaves, Chemistry of the Grape and of Soils, Observation Upon Flowers, Theory of Tillage and Productivity of Land, What are Fungi, Observation Upon Fruits, Commercial Grape Culture in Chautauqua County, Observation Upon the Apple, General Question Box, etc. All of these topics were conducted by professors of Cornell University or by competent persons selected by those who were authorized to do so.

With the beginning of 1898 it was thought wise to give a course of lectures on agriculture in the schools of Ithaca to ascertain if this work would harmonize with the present curriculum, and not seriously increase the required work. The two following letters will show the value of the lectures:

Ithaca, N. Y., Jan. 28, 1898.

Prof. I. P. Roberts:

Dear Sir—On behalf of the A room of the Grammar School, I wish to thank you and the professors whom you sent for the lectures and demonstrations which were given before the pupils of that room during the past term. I was present but very little myself, but the teacher reports a very great interest on the part of the pupils. Every one of the lectures was used as a basis for composition work. It seemed to us that the English work resulting was unusually good, and that there was a decided improvement, a part of which at least we attributed to the very great interest of the pupils and their desire to give expression from a mind full of the subject. It appears to me that full and free use of language must necessarily arise from an abundance of thought press-

ing for expression. A full flowing stream implies an overflowing reservoir.

This work is not to be classed under the head of science or nature study purely, wherein the method is to employ the child's powers of observation and judgment. Its purpose was rather to arouse an interest in the science of agriculture. These city pupils will always have hereafter the highest respect for the work and life of a farmer, and many of them without doubt will observe and think intelligently upon the methods of agriculture. I have no doubt that some will put into practice much that they have learned. It is conclusively proved that agriculture may be made an extremely interesting and valuable subject of study in all schools.

Yours very truly,

H. W. FOSTER, Supt.

Prof. I. P. Roberts:

Dear Sir—I have attended three or four of the lectures on "Nature Study" delivered by you and your associates at our parochial school. Judging by the good attention shown by our pupils, and the earnest manner in which they answered the questions put to them, I am convinced that the lectures were pleasing and instructive.

The work in which you are engaged can not fail to be productive of much good in our schools, because the pupils are made familiar with those things which will be of much benefit to them in after life. I sincerely trust that you will be enabled to continue the lectures, not only this year, but permanently.

Thanking you for the many past favors, I am, Yours Sincerely,

A. J. EVANS.

Rector, Church of the Immaculate Conception.

PUBLICATIONS.

The publications thus far were in the form of bulletins bearing on the

experiments which were started for the benefit of the people of western New York, and were written by the persons to whom these experiments were entrusted. They dealt with fruit growing, plant diseases, spraying, insects, vegetables, flowers, etc.

THE WHOLE STATE.

In 1897 a fourth appropriation was made by the legislature, now reaching the sum of \$25,000. The work was now entrusted to the Agricultural College, instead of the Experiment Station, as heretofore. It now applied to agriculture in general, and covered the whole state. The general plan remained the same, the only difference being that it applied to a larger field, both as to subject matter and territory.

NATURE STUDY.

What is known as the Nature Study work was started about 1896. That we may get a clear idea of what it is, we will use Prof. Bailey's definition: "It is seeing the things which one looks at, and the drawing of proper conclusions from what one sees." The condition of the farmer in New York is to be bettered, and it is to be done by beginning with the child. Take the little fellow to whom farm life is a drudgery; he would be anything but a farmer. Introduce him to the wonderful things on the farm; begin with very simple things as a twig, a seed, a butterfly, and lead him gradually to understand somewhat the nature of plant growth and behavior, the nature of the soil, the different stages in the development of a butterfly, make at least an honest endeavor to answer some of the numerous questions which his inquisitive mind asks, and I think he will readily learn to like the farm and farm life, and in many cases will prefer it to anything else. This is exactly what nature study is trying to do. Prof. Bailey says: "The proper object of nature study

are the things which one oftenest meets. Today it is a stone, tomorrow it is a twig, a bird, an insect, a leaf, a flower." The little folks will be delighted with such things, and it is astonishing what progress they will make in such work if properly guided. But who shall properly guide them, you ask? Our teachers have not had sufficient scientific training to teach this science. If the teacher or parent is interested in this kind of work he will find no great difficulty in doing a great deal of good in this line. Prof. Bailey in admitting the need of preparation on the part of the teacher, says: "It is not necessary that he become a scientist in order to do this. He simply goes as far as he knows, and says to the pupil that he can not answer the questions which he cannot." I think we sometimes impress our pupils too much as though there were no knowledge beyond that which the teacher happens to possess. "The best teacher," says Prof. Bailey, "is the one whose pupils the farthest outrun him."

To give this work the prompt attention it should have, a Bureau of Nature Study has been established, with offices at Cornell University. Of this bureau Prof. L. H. Bailey is the chief, Mr. John W. Spencer is deputy, and Miss Mary F. Rogers is instructor in Nature Study. There are, of course, other assistants and instructors. All of these are efficient workers in the lines they represent. The instructors visit different parts of the state to aid in teachers' institutes and in Nature Study schools. In this way they render the teacher valuable assistance.

The bureau offers the teacher still other assistance by sending out teachers' leaflets. These give the study to the school.

It may be well right here to mention the leaflets by name and author:

No. 1—How a Squash Plant Gets Out of the Seed, by Prof. Bailey.

No. 2—How a Candle Burns, by Prof. Cavanaugh.

No. 3—Four Apple Twigs, by Prof. Bailey.

No. 4—A Children's Garden, by Prof. Bailey.

No. 5—Some Tent-Makers, by Mrs. Comstock.

No. 6—What Is Nature Study, by Prof. Bailey.

No. 7—Hints on Making Collections of Insects, by Mrs. Comstock.

No. 8—The Leaves and Acorns of Our Common Oaks, by Mr. Wyman.

No. 9—The Life History of the Toad, by Prof. Gage.

No. 10—The Birds and I, by Prof. Bailey.

No. 11—Life in an Aquarium, by Miss Rogers.

Aside from the above Mr. Spencer has issued a Kindergarten Supplement entitled "A Corn Plant Story."

All of these are scientifically correct, and yet very simple and very interesting, and can not fail to be profitable. The bureau also freely issues circular letters to teachers.

I would not have you think that these leaflets are merely theoretical. The author in preparing that leaflet had before him the public school as an object. The subject has been thoroughly studied, and actually brought within reach of the public school. The teacher can have the same experiments in her school if she wants them. The pupils are intensely interested in such things. A few years since, when teaching in a public school, we planted some corn. The pupils were asked to dig up a kernel now and then to see what it was doing. I think no spot of earth ever received more attention than the one containing those few seeds of corn.

These leaflets are eagerly sought by the teachers of New York. So

far some 22,000 teachers have made written application for them.

To give an idea of how the educators of the state look upon this new feature of school work, let me use two of the many unsolicited letters received at the bureau.

"Your visit to our school has been very pleasantly discussed by many of our students and teachers. I think that I may say by the more intelligent ones. I believe it sowed seed for thought and in good ground.

"We have perhaps seventy-five students from farms, and presumably among the best of them, and I am of the opinion that a day or a half day spent by them under the instruction of your department, by coming to us, will be sowing seeds that will yield some sixty and some a hundred fold.

"I want to express myself in favor of such work being done in schools like ours in the state.

Most respectfully yours,

B. G. CLAPP,

Principal Fulton High School."

Fulton, Oct. 28, 1896.

"I send you under separate cover a number of letters written by some of the children whom you addressed. They are sent you just as written by the pupils, without assistance, and are self-explanatory.

"We will be pleased to use whatever help you can give us for our general work, which comes about once in two weeks.

"The impression you made upon the boys and girls here was excellent. Yours with respect,

WM. C. NOLL,

Principal Naples Union School."

Naples, Nov. 16, 1896.

READING COURSE.

The Farmers' Reading Course was started in 1897. Its object being to encourage the farmer to do definite reading at home. The reading matter consists of bulletins bearing on important lines of interest to the farmer. So far only bulletins issued

by the experiment station at Cornell and that at Geneva have been used. To this is added a carefully selected list of books. This work met with such interest that a year later 3,000 young farmers had registered in this course. The general plan of the course is somewhat similar to that of the Chautauqua Course.

To lend encouragement to the readers, special reading lessons are issued. The two I happen to possess are "The Soil: What It Is," by Prof. Bailey; "Texture of Soil and Conservation of Moisture," by John W. Spencer.

CONCLUSION.

The foregoing is but a brief outline of a most commendable scheme for bringing into view the pleasant and practical side of the farm. Farm life loses its sense of drudgery as we bring some of its beautiful features to the surface. Oh! if we could only read the farm and become familiar with the many stories, lectures and intensely interesting bits of information it holds out to us, we would cherish the old homestead vastly more than we do. I fear that conditions in New York are not so very different from those in Ohio. If you poll the rural schools of Ohio, or of any state in the Union, the farm will beg loudly for its rightful support.

When I was asked to contribute something for this meeting it was suggested that I recommend some new experiments, which this Union might investigate and use. Here, then, are three experiments which I heartily recommend for your most careful study: First, the feasibility of agricultural schools in various parts of the state; second the introduction of nature study into the schools of the state, and, third, the establishment of farmers' reading courses. I can recommend nothing of greater importance, neither can I think of anything which would do the state a more lasting good. If

you wish to experiment with something that will bring good results from the cradle to the grave, you have before you a rich field. If you have the will, you have just as much power as a few Chautauqua county people. What were they but a few farmers and grape growers. They sought to improve their conditions, and went at it in the best way they could devise. The result of their work is this great waking up all over the Empire state. Just because a few farmers went to work in real earnest.

But let us lay aside all thought of a \$25,000 appropriation. If you can get a fair appropriation, so much the better. But at present you are without it. That should not hinder you from doing grand work along this line immediately, if you have the inclination to do so. There are many ways to secure a little money to get a few leaflets on nature study for the teacher in your district. There are likewise many ways in which the other phases of the work can be inaugurated. Each member of the Union might consider himself a committee of one to start the work in his neighborhood. Start definite reading and ask a few of your neighbors to join you. Meet at some place on an evening now and then to talk over what you have read. What is to hinder this Union from outlining a course of reading?

FRED. K. LUKE.

Two Usually Fatal Diseases of Farm Animals Which May Be Readily Prevented.

It was the Scot who said that "an ounce of prevention was worth a pound of cure." If he had made the pound a ton his maxim would have been all the more true. The medicine of the present tends toward the prophylactic; the medicine of the past more toward the remedial.

While medicine has been practically revolutionized in the past twenty years, and the science of bacteriology been especially potent in explaining and clearing up many mooted and obscure problems in the causation and prevention of diseases due to pathogenic germs, it has, as yet, taught us little of the remedial. Much of this possibly comes from the fact that the cure in many instances would be worse than the disease; i. e., remedial agents which would annihilate the direct cause of the disease (the germ or its toxic product) would also kill the host that harbors them. Our treatment, therefore, can not be in such cases a rational one; we must confine it to fortifying the host's ability to resist the ravages of the bacteria and the poisonous materials they produce. Up to the present our ability to prevent, control and stamp out many diseases is far in advance of our knowledge of curative agents, which will do in practice what is claimed for them in print.

Though the exact cause of neither of the peculiar diseases to be touched upon in this article is known, one must be convinced that future bacteriological research will throw much light upon their etiology.

Though nearly all of the diseases of farm animals might readily be prevented if stock owners possessed a better knowledge of the etiology of diseases, but few can be readily prevented by practically applicable, precautionary measures, and none, perhaps, as easily avoided by the observance of simple hygienic rules as the two considered below, affecting the most valuable kinds of farm animals.

The first disease is not uncommon in the horse. It affects mainly large, fat draft horses, accustomed to steady work and high feed. It ap-

pears in nearly every instance after a short period of absolute rest (usually of one or two days), when the animal is laid up from its usual work and allowed its full food ration. The symptoms appear when the animal is again placed at work. For this reason, in certain districts it is known as "Monday morning disease," "Easter disease," etc.

The symptoms, which appear with often alarming suddenness, commonly within 15 or 20 minutes after being taken out of the stable and put to exercise, are much as follows: First, a stumbling in one or both hind limbs, and later a stiffness is apparent in the gait; the animal, if forced forward, finally breaks out into a profuse sweat, staggers, trembles and eventually falls to the ground, where it makes violent but futile efforts to regain its feet. On closer examination the muscles of the croupe will be found to be tensely swollen, hard as stone, tender and incapable of performing their functions. In some cases the muscles of the shoulder and neck are like involved, but this is unusual. After a period of spasms, excited reflexes, which seem to come from extreme pain, the animal becomes more quiet, and, though unable to rise, partakes of food and drink as usual. There is frequently neither elevation of temperature nor acceleration of pulse in this stage. The urine voided is in color abnormal, varying from a light claret to a chocolate brown. Much muscle coloring matter—haemoglobin—is contained, but rarely blood in toto. Formerly this disease was known as "azoturia," "acute nephritis," etc., all of which were misnomers.

The mortality is very high; on an average 70 per cent. die, or are rendered for a long time useless from resulting infirmities. One attack

does not render the animal immune, but on the contrary predisposes to subsequent attacks.

Prevention: Allow all large, fat, muscular horses exercise for 15 minutes daily while off duty, and reduce their feed one-third. Bran should also be fed liberally, that the bowels may be kept open. There is no record of a horse so treated that has ever taken the disease.

The second disease concerns the cow, and is known among the laity as "milk fever." The symptoms make their appearance suddenly in from 12 hours to three days after calving. Deep milkers and good feeders are most commonly attacked. Cows of slight build that have been thin and then allowed to take on flesh rapidly in advanced pregnancy are most predisposed. An exceptionally easy delivery seems to be another factor favoring the development of the disease; heifers with first calf, and cows to which assistance has been given during delivery are never attacked. When a cow is at the acme of lactation (third to fifth calving) they show the most predisposition.

The disease is ushered in suddenly a short time after an unusually mild delivery, and begins with the animal's refusing food or water. They appear restless, languid, gait becomes labored and staggering, and finally they fall to the ground, where they lie in a dazed stupor. The head is thrown around to the side; if we raise it up it falls back again to position. The facial expression is blank, clouded; eye mostly sunken into socket, pupil dilated. Breathing is slow and accompanied by a tone that resembles a snore. The throat is frequently paralyzed, and from the corners of the mouth threads of saliva drude; a whitish, lymph-like fluid flows from each nos-

tril in a fine stream. Movements of the bowels and passage of urine are suppressed.

The course is very acute; the case is usually decided in from one to three days. Recovery takes place only in about 55 per cent. of the cases. Of 721 cases treated by Dr. Franck of Munich, 294 head died. Frequently apparent mild cases die suddenly (paralysis of brain), while those of the severest type make good recovery.

Although nearly all the drugs in the pharmacopoeia have been tried, none have given anything like successful results.

Prophylaxy: Allow to pregnant cows plenty of exercise. Cows on pastures which are not too rich are most rarely overtaken by the disease. Heavy grain foods should not be allowed for four weeks before calving, and the bowels kept open with a dose of Glauber salts, which in no case should be given later than 10 days before the cow is due to be fresh. The observance of these simple suggestions will positively prevent milk fever's appearance among the cow herd, and as this particular disease is prone to clutch within its embraces the best, most productive and valuable cow of the herd, its prevention means always, from a pecuniary standpoint, a saving to the breeder and dairyman.

It is hoped that the reader of this short article will not think the less of it because of the simplicity of its suggestions along the line of disease prevention. All that is rational is simple; nothing is more rational than nature, and her most complex phenomena are really marvels of simplicity when we understand them. Dr. David S. White.

A Difficult Diagnosis.

To make a correct diagnosis of lameness in the horse is one of the

most difficult tasks of the veterinarian, and one which he is constantly called upon to perform. It is of course comparatively easy to tell in which leg the animal is lame and the kind of lameness, whether articular or muscular, but to point out the exact locality and determine the extent of the injury is something which requires a thorough knowledge of anatomy, a thorough understanding of the pathological conditions of different lamenesses, and unlimited patience. To make matters worse the horse is often lame in two legs, and assumes such an unnatural gait that typical symptoms are obscured and others present which are very confusing. The diagnosis of lameness is very easy to the layman. He invariably locates it in the shoulder in the anterior limb and in the stifle in the posterior, and generally applies a blister or liniment over these parts when, as a matter of fact, nine out of every ten lamenesses are located below the knee or hock. The animal failing to recover or improve under their treatment, or in spite of it, veterinary aid is sought as a last resort. When a diagnosis is made and the owner informed as to the nature of the trouble, treatment required, etc., he is generally incredulous and very reluctant to apply the treatment, especially if it includes resting the animal. The average owner is willing enough to rub on liniment, etc., as long as he can keep on working his horse, but it is difficult to make some owners comprehend that rest is as essential to recovery in a horse as in himself. A great many interesting cases of lameness are brought to our clinics every year, some of which are exceedingly difficult to diagnose. Many cases of interest might be cited, but the following two cases will be especially interesting, as the cause of lameness in both animals was definitely ascertained.

CASE NO. 1.

On Sept. 26 of last term a sorrel pony was brought to our clinic for treatment. The animal was a small western pony, about 700 lbs. in weight, 12 years old, in poor condition. The owner stated that he had used her for some years for driving cattle, had shipped her here from the west for this purpose. She had been an excellent animal for the work, being prompt, willing and well trained to the work, and for this reason he was anxious to keep her. He gave the history of her lameness as follows: About a month previous, while riding her at a sharp gallop on High street, she slipped on the smooth pavement and fell. She regained her feet with some assistance, but was unable to walk, as the left patella was dislocated, the limb being held in that stiff "locked" manner peculiar to laxation of the patella. Veterinary assistance was called and the patella replaced, and after being left 24 hours in a barn near at hand he was able to lead her home. As she was very lame he turned her out, thinking that with a short rest she would recover. When we saw her he said that her condition was practically the same as it had been all along. At a walk nothing unusual could be detected; when forced to trot she did so with great difficulty, the hind limbs were spread wide apart, the toes were dragged on the ground and the stride was very short, stumbling was frequent and the animal could hardly trot a hundred feet before coming to a dead standstill. No definite diagnosis was made at the time, but the owner was advised to apply liniment to the internal femoral muscles and report progress shortly. About a month later he sent her back with the request that we keep her a day or so, and if nothing could be done for her to use her for anatomical purposes. Her condition was practically the

same, except, perhaps, that a trot would be maintained slightly longer than before. Most careful examinations were made and all tests for lameness applied without any satisfactory results.

The pony was spavined on both hocks, but as they were of long standing, some distance below the joint, it did not seem to be causing the trouble. The "spavin test," flexing the joint for some minutes and then trotting the horse sharply, did not indicate the spavins as the seat of the lameness. As the animal was of little value and the case deemed hopeless it was decided to destroy her and reserve the diagnosis until a careful post-mortem examination had been made. On post mortem it was discovered that a double-sided fracture of the pelvis through the obturator foramina had occurred, the transverse portion of the os pubes and the external portion of the ischium being fractured on both sides. The posterior portion of the pelvis was covered by exostoses, rendering it porous and spongy and easily fractured. Whether or not this morbid growth was prior to the fracture is of course only a matter of conjecture, but the conditions existing were unusual. Considering the extent of the injury it is remarkable that the pony was able to get about as well as she did, nor is it surprising that a correct diagnosis was not made during life. Had it been possible to correctly diagnose the case no treatment could have been applied, as the structures involved were too deeply seated. In this case the dislocated patella was only coincident with the fracture, and was in no way responsible for the lameness, although in this instance the owner could hardly be criticised for thinking that it was the sole cause of the animal's lameness, and applying treatment accordingly.

CASE NO. 2.

Shortly before the holidays a bay gelding was left at the hospital with the request that a thorough examination be made and the right treatment applied. The owner stated that about a year previous the animal had run away and run violently against a lamp post, and had been very lame across the kidneys ever since (a very favorite delusion with laymen), in addition to other minor injuries too numerous to mention. As the animal was quite well bred and had been a very free traveler the owner was very anxious to have everything possible done to restore him to usefulness. The horse was quite lame both on the walk and trot; the stride was very short, the front feet being disposed of after the manner of a foundered horse. No lameness could be detected behind, nor could any soreness be found in any of the muscles or tendons of the fore limbs. The front hoofs were very hard, so hard that they could not be pared with a knife, nor could any impression be made with a hoof searcher. A flaxseed poultice was applied to each of the front hoofs and the horse allowed several days' perfect rest. The animal showed very little if any improvement after this treatment, although the hoofs were much softer. A thorough examination could be made now, however. No corns were found on paring down the hoofs, but pressure across the heels with the hoof searcher caused the animal to flinch. This gave rise to suspicion of navicular disease. To confirm the diagnosis cocaine was injected around the hoofs just above the coronary band. After waiting long enough for the cocaine to take effect the horse was taken out and trotted very sharply. A marked improvement in the gait could very easily be seen, thus confirming the diagnosis. As navicular disease is incurable the

horse was discharged, with instructions to shoe with high-heeled shoes, or as a last resort to return him and have neurectomy performed. The objection to the operation is that in shoeing or otherwise, a nail may penetrate the hoof, and as the animal has no sensation in the foot the first thing noticed would be the dropping off of the hoof, which of course would render it necessary to kill the horse.

AN UNEXPECTED TERMINATION.

At the clinic hour on Nov. 11th we were requested by an aged colored man to send a man with him to see his horse, which had fallen at the corner of Eighth and Neil. He stated that in pulling the horse up sharply to turn the corner he had slipped on the frosty pavement and fallen, and was unable to rise. On reaching the scene we found a roan gelding, in very fair condition, lying in the gutter, surrounded by the usual crowd, most of whom offered to put the animal on his feet as sound as ever in less than twenty minutes. At first sight the horse seemed to be suffering from colic, as many of the typical symptoms were present, groaning, looking toward flanks, etc. He was unable to rise, however, even with plenty of assistance. A careful examination was then made which revealed a double-sided inguinal hernia. The animal in falling had ruptured the abdominal tunic. This explained the colicky symptoms. As treatment would have been difficult and expensive and the horse being of little value, we advised destruction, to which the owner consented, consoling himself by saying that he only paid four dollars for the horse a year before. As we had nothing at hand with which to humanely kill the animal, we notified the Columbus Sanitary Works to send a wagon. While waiting the animal began to show great pain, weakness, made frequent futile at-

tempts to rise, the mucous membranes of the nostrils became very pale, a cold sweat broke out, and in a very short time the horse was dead. These sudden, acute symptoms were somewhat puzzling, and could only be attributed to sudden internal hemorrhage. Post mortem, which unfortunately we were not able to conduct ourselves, revealed the abdominal cavity filled with blood, in addition to which the femur was badly broken and shattered at the neck. This was not suspected, and accounted for the sudden and unexpected hemorrhage. The animal, in struggling to rise, had severed a large artery or vein with the jagged splinters of bone, and bled to death in consequence. C. W. E.

Finance.

No abatement is yet visible in stock speculation, and the market continues to show a high range of activity. In many instances the current quotations for stock in the New York market are highest since the boom of 20 years ago. This, however, is less significant than the speculative activity which is reflected by aggregate stock exchange transactions for the past month to the amount of about 1,000,000 shares for each full working day. Each succeeding day has become one of record breaking activity level for speculation. While the future of the market is exceptionally promising, there have been and still are cautious people, who think that prices have risen pretty near to the danger point.

These judgments have been based upon experiences of a sort of market lacking staying powers, while this one includes elements of strength such as have not existed for many years. All the elements that have excited distrust for years past have disappeared, and the country is uni-

versally believed to be entering upon an era of prosperity surpassing all former experience. These estimates of national prosperity are not mere dreams of sanguine speculators, as they are demonstrated by an unbroken array of statistical evidence.

Continued extraordinary earnings of the railroads and the enormous bank clearings of the country are proof of the great activity of general trade. The country is on the upgrade, and the men who expect it to take the downward road have yet some time to wait. There are no indications of the reaction which always follows a large and rapid business recovery, and existing conditions in the industries and in foreign trade by no means forbid the hope that the increase may continue for several years.

The year 1898 was not only one of victory, of important increase in territory and incalculable expansion of the influence of the United States among other nations, but surpassed all other years in financial and industrial results. The center of financial power has crossed the ocean. This year begins with a kind of business demand that counts. For months there has been a rising demand for materials, but now the crowding demand for finished products begins to advance prices and start traffic both ways across the country, thus further increasing railway earnings.

The iron and steel manufacture leads all others in the volume of new business. While production is much the largest ever known, many of the works are checking orders which they can not fill for months to come. The number of such works is rapidly increasing, as the very heavy demand for materials covers many months' capacity, and finished products are in great demand, especially for car building and ship

works at the west. The triumph in finance has been largely due to industrial progress. The output of pig iron for 1898 was about 11,645,000 tons, the greatest yet reached in any year by 2,000,000 tons, and greater than Great Britain ever reached by 2,800,000 tons. Exports of iron manufacture in 10 months were about \$87,644,536 in value, against imports of \$13,497,817. Prices for iron and steel have been unusually steady.

A survey of the wool situation in the United States for 1898 in all its features shows that there were, Dec. 31, 1898, 279,319,017 pounds of wool in the United States outside of manufacturers' hands, against 223,719,296 pounds at the close of 1897, which shows the stocks throughout the entire country are 55,599,721 pounds larger. Wool has come forward from the West much more slowly than usual on account of the great plethora of money in the hands of the producers. There has been a falling off of practically 50 per cent. in the receipts of domestic wool at Boston for 1898, as compared with the previous year. The average weekly sales of wool in the three leading markets were only about 44 per cent. as large as in the year when the Dingley tariff law was under discussion. Nominal quotations on wool were fairly well maintained during the larger part of the year, but in the last quarter there was a decline in which the foreign wools shared.

A notable exhibit is made by the treasury statistics of foreign commerce of the United States for the year 1898. The total exports amounted to \$1,254,925,169, which represents an increase of over \$155,000,000 as compared with those for 1897, and of over \$249,000,000, as compared with those of 1896. The imports were valued at \$633,664,634,

which represented a decrease of over \$108,900,000, as compared with those of 1897, and of over \$47,900,000, as compared with those for 1896. The value of exports for last year was not far from double that of the imports. The excess for the year amounted to \$621,260,535, which was greater by \$264,146,719 than that of the preceding year. The exports were the largest in the history of the country, while we have to go back for a period of 13 years to find a total of imports so low as that recorded for 1898.

Such conditions result in the greatest balance of foreign trade in favor of this country ever known, and January reports thus far indicate a continuance of similar excesses.

The failures for the year 1898 were 12,266, banking and other financial concerns included, with liabilities of \$149,057,993, 18.3 per cent. less than the previous year, and 46.1 per cent. less than in 1896. Commercial failures were 12,186, with liabilities of \$130,662,899, 15.3 per cent. less than last year, and 43.2 per cent. less than in 1896. The average of liabilities, \$10,722, is the smallest ever recorded.

The prospects of the home money market are virtually conclusive in favor of a continuance of easy rates of interest. With call money at 2 to 2½ per cent. and time money obtainable at 2½ to 3 per cent. for large sums, those with optimistic views of the speculative turn of the country have a strong argument. There is a closer connection between money rates and financial conditions than a casual observer would expect. The community is becoming so accustomed to statistics of increased trade and reports of lower money rates that phenomenal showings are scarcely noticed any more. C. L. S.

Financial Editor Columbus Dispatch.

BOOK REVIEWS.

THE EVOLUTION OF PLANTS:

Douglass Houghton Campbell;
pp. 320; illustrated; cloth; The
Macmillan Company; \$1.25.

Thus far the greater part of the discussion of questions concerning evolution and kindred questions has been confined to the animal kingdom, and many laws that have been elucidated upon facts relating to one kingdom have been confused into being accepted for both animal and vegetable. Perhaps much of the controversy over this question has arisen from this confusion of laws for plants and animals. The book above mentioned, while it makes no claims to originality, is original in its choice and arrangement of subjects and matter. The writer says that he has "availed himself freely of the materials accumulated through the labors of botanists during the past fifty years."

Beginning with an introduction concerning the "basis of life" and life functions the author goes on to discuss briefly cell division and plant relationship. "The conditions of plant growth" is the theme of the second chapter. In this chapter the conditions governing plant growth and development are discussed, embracing a survey of the conditions for growth for the entire plant kingdom, from the lowest to the highest.

In the third chapter, under the title of "The Simplest Forms of Life," the very lowest forms are described. There are in particular two groups of these indifferent organisms (where it is hard to determine whether they belong to the animal or vegetable kingdom), those included by Haeckel in his *Monera*, such as *Vampyrella* and *Protomyxa*, and those curious organisms, the "slime-moulds — *Myxonecyetes* or *Mycetozoa*." In the summary to this chapter the author says: "The

slime-moulds and *Monera* represent two evidently related branches of a common stock, which is, perhaps, on the whole, more animal than vegetable in its nature."

From this place on, from the fourth to the eleventh chapters, the gradual steps of development in the plant kingdom are considered, *Algæ*, *The Fungi*, *Mosses* and *Liverworts*, *The Ferns* (2 chapters), *Seed Plants*, *Angiospermæ* (*Monocotyledons*) and *Dicotyledons* being the subjects of the various chapters.

Under geological and geographical distribution the evidences of geology in evolution are given, and the factors that determine geographical distribution are treated of.

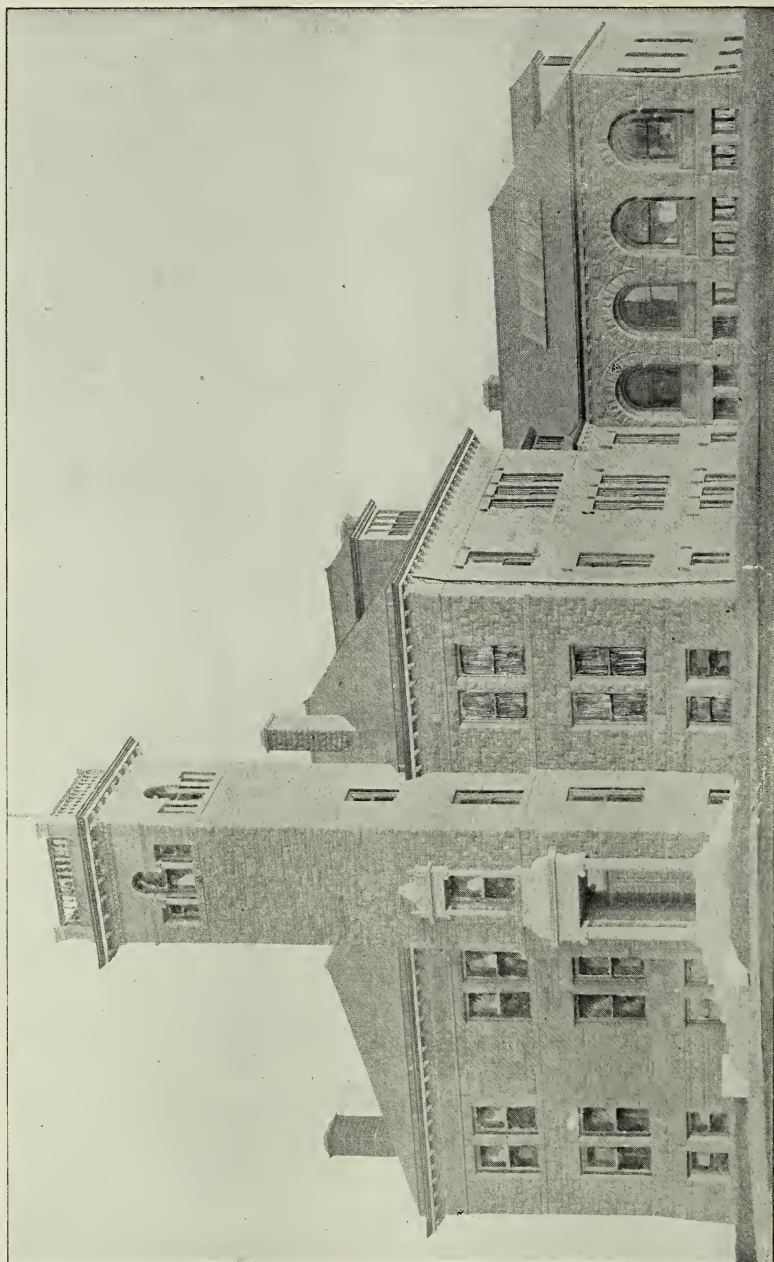
Chapter thirteen is an interesting lecture on animals and plants, and the following chapter takes up the influence of environment. Both of these lectures are extremely interesting and should be read by botanists, horticulturists, in short, all naturalists. In the concluding chapter summary and conclusion is given.

A collection of lectures that are clear in statement, and of such a nature they can not be called technical. A book which may be read with profit by those interested in plants.

Seed Catalogues Received.

VICK'S (Rochester) GARDEN
AND FLORAL GUIDE—Golden
Wedding Edition.

This handsome catalogue is bound in a beautiful cover of green and gold on white enamel paper. The first part of the book is beautifully illustrated in the natural colors of the plants and flowers. This being the fiftieth anniversary of the business life of this firm, they are making some very attractive offers to their customers.



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